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Clear path to automation: KUKA brings first intelligent bin picking system to market

KUKA

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The new KUKA.SmartBinPicking software offers the perfect combination of AI-based recognition of objects as well as precise path planning of the robot

Augsburg, October 2022 - Reaching into a crate and retrieving specific parts: With the KUKA.SmartBinPicking software and the associated components, our robots are perfectly equipped for this job. The solution is now available for the first time in a package as a vision tool kit, making it much easier to integrate into production.

It's easy for a human to reach into a bin and pick up a screw without hitting an arm on the bin edge. A robot needs precise motion planning to reach into the bin at the correct angle and grip the right part. With proper preparation, the robot can relieve humans of tedious, monotonous bin-picking work – and do so reliably, quickly and without tiring. For precise calculation of these picking parameters, KUKA partnered with vision expert Roboception to develop a technology package that's easy to integrate into the production process with no major programming effort.

Sophisticated path planning for collision-free bin picking

Roboception's 3D camera – included in the technology package – sends images of items for picking and their environment to a computer for perfect, singularity-free path planning. The KUKA.SmartBinPicking software calculates the most efficient collision-free path for the robot arm to reach the desired item, taking the robot structure and the gripper into consideration. This collision-free path planning reduces downtime to a minimum. When detecting objects – whether sorted or unsorted – the software also prioritizes parts that the robot should grip first, perhaps because they are on top.

AI-based learning process optimizes the CAD model

Object recognition is trained in advance in a photorealistic simulation environment that uses a CAD model optimized for color reactions, materials and lighting conditions. AI optimizes recognition of any object for identification even in difficult scenarios. “Each object to be picked from a bin is trained over a specific time period in our AI-supported simulation environment. This training process can run overnight so the application is ready for use the very next day,” said Michael Hohenäcker, Portfolio Manager for Handling and Vision at KUKA.

Parallel path planning reduces cycle times

Collaboration with Roboception also has enabled KUKA to offload path planning to an external computer with no impact on robot controller performance. Hohenäcker explained that this offers a very specific advantage: “Even while the robot is bin picking, the next path is already being planned in parallel, which reduces cycle times.” Customers also save time when they integrate the solution. With modern web-based configuration technology, customers can view their unique case in a 3D model and control their system specifications with ease, with no need for in-depth programming experience.